November 28, 1990

MEMO TO: LACTC MEMBERS/ALTERNATES AND SCRTD BOARD MEMBERS, DECEMBER 5, 1990 MEETING

FROM: ALAN PEGG AND NEIL PETERSON

SUBJECT: TRANSIT SERVICE OVERCROWDING

ISSUE

Many routes operated by the SCRTD and Los Angeles County municipal operators currently experience passenger overcrowding. During the next several months, LACTC and SCRTD staff will cooperatively develop options to specifically address SCRTD and municipal operator passenger overcrowding.

RECOMMENDATION

Review and comment on the attached work program (Attachment 1) and draft preliminary report (Attachment 2). The preliminary report defines the project scope, summarizes the extent of Los Angeles County passenger overcrowding relative to other major transit properties, and lists several potential short and long-term options to resolve overcrowding. Specific actions to resolve overcrowding will be presented at the March 1991 Joint LACTC/SCRTD Board Meeting.

BACKGROUND

At the August 1990 LACTC/SCRTD Joint Board meeting, Commissioner Antonovich asked his appointee, SCRTD Board President Nick Patsaouras, to "request that LACTC and SCRTD Executive Officers meet to discuss and report at the next joint meeting the overcrowding of buses, suggest improvement of efficiency, and/or the need for additional funding". During the past few months, staff from both agencies have met on several occasions to discuss the extent of passenger overcrowding and the process required to resolve the issue.

In September, a joint staff overcrowding committee was formed. The objective of the committee was to develop a work program which would identify the factors contributing to passenger overcrowding and the alternative approaches to resolve overcrowding. The attached work program, developed by the committee, represents a practical approach to resolving SCRTD passenger overcrowding.

On November 19, 1990, the work program was presented to the LACTC Planning and Mobility Improvement Committee (PMIC) for review and comment. The following recommendations were made by the PMIC:

- Extend the scope of the study to include Los Angeles County municipal operators (in addition to the SCRTD);
- Discuss (in the preliminary report) SCRTD's current passenger overcrowding experience and the steps taken to-date to resolve SCRTD overcrowding;
- List (in the preliminary report) "4 or 5 SCRTD lines that are currently overcrowded and immediate solutions, ... including reconfiguration of service".

CONCLUSION

Due to the extent of research required to accurately identify the full range of options associated with addressing SCRTD and municipal operator overcrowding, the preliminary report has focused primarily on defining the scope of the issue. The first two recommendations made by the PMIC have been addressed in the preliminary report. A list of all overcrowded lines and comprehensive description of options to resolve overcrowding will be developed during the next few months. The final report, which will include short and long-term line-specific recommendations, will be presented at the next Joint Board meeting.

ALAN PEGG
General Manager

NEIL PETERSON
Executive Director

Attachments

2385314

Attachment 1

TRANSIT SERVICE OVERCROWDING
Work Program - November 9, 1990

I. ISSUE

It appears that many SCRTD routes currently experience overcrowding. Patronage forecasts, adjusted for increasing gas prices, higher parking fees, energy contingency actions, and AQMD regulations, suggest that the current situation could soon become much worse. During the next several months, SCRTD and LACTC staff will cooperatively develop options to reduce SCRTD passenger overcrowding.

A. Summarize August 1990 Joint LACTC/SCRTD Board Meeting discussion regarding overcrowding.

II. BACKGROUND

A. Define passenger overcrowding versus SCRTD currently adopted overcrowding standards.

B. Compare the utilization and efficiency of Los Angeles County transit operators with other major national and state properties.

C. Discuss SCRTD's current overcrowding experience:

- Extent of overcrowding (commute versus non-commute travel periods).
- Is overcrowding line-specific, corridor-specific, or system-wide?

D. Discuss the factors which contribute to overcrowding:

- Increased patronage.
- Sufficient headways to meet peak period demand.
- Reduced average vehicle speeds (due to increased traffic congestion and/or decreased street capacities).
- Reduced seating capacity (as a result of recent bus procurements).
- Other.

III. LOADING POLICIES

A. Discuss current SCRTD standards which attempt to address transit service overcrowding:

- Loading policies. What are the current standards? When were they developed? How have they evolved over time?

- Discuss performance compared to adopted load standards. What has been the response to services determined to be overcrowded, i.e., solutions and mitigation measures? How has performance changed over time? Where are the most serious occurrences of overcrowding? Where is there excess capacity?

- Evaluate other operator standards/criteria used to deploy service.

IV. POTENTIAL OPTIONS

A. Discuss potential short and long-term options to resolve overcrowding, including the following:

- Redeploy existing vehicles (from low demand lines).
- Modify load factor policies.
- Increase dedicated street/freeway transit capacities (HOV, reverse lanes, etc).
- Implement peripheral parking strategies (to improve mid-route on-time performance).
- Operate additional vehicles.
- Increase real-time control, i.e., supervisor control, schedule adherence, etc.
- Other.

V. IMPLICATIONS OF REDUCING OVERCROWDING

A. Required administrative/policy actions (associated with implementation of exclusive bus lanes, signal pre-emption, peripheral parking, etc.).

B. Operational and/or policy trade-offs.

C. Financial impacts and changes in patronage (impacts vary by solution).

D. Impacts associated with increased parking fees, increased gasoline costs, reductions in parking subsidies, AQMD regulations, and implementation of energy contingency actions.

Attachment 2

Los Angeles County
Transportation Commission
818 West Seventh Street
Suite 1100
Los Angeles, CA 90017
213/623-1194

LACTC

RTD

Southern California
Rapid Transit District
425 South Main Street
Los Angeles, CA 90013
213/972-6000

November 30, 1990

TO: Los Angeles County Transportation Commission
Southern California Rapid Transit District
Joint Policy Board

FROM: Neil Peterson, Executive Director
Alan F. Pegg, General Manager

SUBJECT: **SYSTEMS REPORT ON PASSENGER OVERCROWDING ON LOS ANGELES COUNTY BUS SERVICES**

EXECUTIVE SUMMARY

In response to a request at the last meeting of the Joint Policy Board, the staff of the Southern California Rapid Transit District (SCRTD) and the Los Angeles County Transportation Commission (LACTC) have jointly undertaken a two-phase review of the efficiency and overcrowding of services operated by the "included" Los Angeles County bus operators. The staffs of the two agencies have been working together during the past two months to meet this request.

This report includes a "system level" comparison of the Los Angeles County operators with major transit systems across the country. A variety of key performance variables are reviewed, including passengers per bus hour, passenger miles per bus mile, cost per passenger mile, passenger miles per gallon of fuel and passengers per peak bus.

The second-phase report, scheduled for the next meeting of the Joint Policy Board, will include a detailed line-specific assessment of the services operated by various Los Angeles County operators and will address concerns of overcrowding, efficiency, and under-utilization.

Based upon the findings contained in this phase-one study, the following general conclusions about the status of Los Angeles County bus services have been developed:

1. Taken as a whole, the services operated by all Los Angeles County operators compare very favorably with the service provided by such major carriers as the New York City and the Chicago Transit Authorities.

2. Based upon this comparison, an increase in service operated by all major Los Angeles County operators would be justified.

3. Based upon the experience of the SCRTD, there has been a 5 percent increase in weekday ridership over the past four months.

4. There are several reasons for expecting transit ridership to increase in the future, including fuel costs, population growth, South Coast Air Quality Management District (SCAQMD) requirements, and increasing congestion.

5. There are many factors which contribute to transit service overcrowding including ridership growth, increased congestion, reduced transit travel speeds, the lack of expedited or preferential treatment for transit, reduced bus seating capacity to provide better safety and comfort, highly discounted fares, and general population growth.

6. Although consistently strong, there are significant differences in the productivity of Los Angeles County bus operators.

7. The SCRTD has taken several steps to reduce overcrowding on its services, including: detailed assessments and adjustments of service requirements on over 100 of its lines over the past year, the implementation of a Service Reliability Improvement Program, reconfiguration of major services such as Line 1-217, and the addition of 50 peak buses in the fall of 1989 and 20 buses in the fall of 1990 to address on-time performance and overcrowding problems.

8. A comprehensive set of actions to improve the efficiency and quality of transit service, including capital investment and facility improvements will be included in the second phase of this study.

9. Future transit capital investments should reflect the operating cost of carrying passengers.

INTRODUCTION

As directed by the Joint Policy Board at its last meeting, the staffs of the SCRTD and the LACTC have undertaken a review of the efficiency and overcrowding of the bus services offered by the SCRTD and the "included" Los Angeles County municipal bus operators.

For the past two months, the staffs of the SCRTD and the LACTC have met on a regular basis in an effort to produce a coordinated report which addresses a wide range of issues concerning the status of bus transit service in Los Angeles County. These meetings produced agreement on a two-step approach for responding to the request from the Joint Policy Board: the first report would utilize "system level" data for assessing the overall efficiency and overcrowding of Los Angeles County bus services and a second report would provide line-specific details on the services operated by the Los Angeles County operators. This approach will permit the development of the required information for the various Los Angeles County operators.

BACKGROUND

The SCRTD Board of Directors has been periodically briefed on the status of ridership and service levels on the District's system. This report will bring the Joint Policy Board up to date and provide comparative information from other transit systems.

During the past few months transit utilization has been increasing. While recent data is not available from all municipal operators, if the SCRTD experience is typical for the region, then weekday ridership is up about 5 percent compared to the same period last year. This represents an increase of about 60,000 boardings per weekday for the SCRTD and an estimated 7,500 for all of the combined municipal operators. The reason for this growth is speculated to be the result of higher fuel prices, SCAQMD regulations, and an increase in population. This increase in ridership has lead many to the conclusion that transit services in Los Angeles County are overloaded.

Overcrowding is generally defined as passenger loads that are in excess of the operator's loading standards. The vast majority of transit operators have loading standards. However, these standards vary greatly between operators. With different loading standards, it is possible that if two transit operators provided service on the same street, each with the same number of passengers on board, one service could be considered to be

overloaded while the other service is not. This will be dealt with in more detail later in this report.

The SCRTD aggressively reschedules and redeploys buses on a regular basis. Every schedule on all SCRTD lines is reviewed at least once each year. Schedule adjustments are made regularly to SCRTD's 190 routes, most of which also have weekend schedules. More than 200 permanent schedule changes will have been made this year. This massive effort to efficiently match resources to ridership is governed by the SCRTD's adopted loading standard. The Los Angeles County transit operators also employ an ongoing analysis in the scheduling of their services. This has resulted in very efficient services.

OVERCROWDING COMPARISON:

To adequately understand the issues of overcrowding and efficiency, it is important to compare the utilization and efficiency of Los Angeles County transit operators with other major national properties. Data from the 15 largest national operators was used to perform this comparison. These operators along with the included municipal operators are listed in Table 1.

The latest available information from national and local properties that is in a comparable format is the FY 1988 Section 15 data compiled by Urban Mass Transportation Administration (UMTA). This data is presented in Tables 2 and 3.

LACTC staff is in the process of compiling Section 15 type data for FY 1990 for the Los Angeles County municipal and regional operators. The analyses of this more recent data will be summarized in the second-phase report to the Joint Policy Board.

SUMMARY OF COMPARISON ANALYSIS:

Analyzing the relative utilization and efficiency of transit operators requires the comparison of statistics. Three measures of service utilization and three for efficiency were selected. These measures are:

Utilization - Boardings per bus hours
- Passenger miles per bus mile
- Passenger miles per peak bus

Efficiency - Passenger miles per gallon of fuel
- Operating cost per passenger mile
- Subsidy per passenger mile

It is important to note that "overcrowding" cannot be directly determined from the system statistics that are available. However, it is possible to infer passenger boardings by comparing measures of resources used relative to passengers carried.

The traditional measure of service utilization is boardings per bus hour. This indicates the average number of boardings for each hour of bus service. Differences from city to city and bus route to bus route make the inference of relative crowding difficult. In addition, changes over time in average bus speed, seats per bus, and passenger trip length make comparisons, even within a system, uncertain.

Passenger miles per bus mile indicates the average passenger load. Because the basic function of transit operators is to move people over a distance, this is a fundamental measure of a property's efficient use of resources. Nonetheless, care must also be taken of this measure. Even though this measure accounts for changes in bus speed and passenger trip length, the difference in the number of seats per bus may affect this measure.

Passenger miles per peak bus indicates the relative use of buses. It also implies the level of strain placed on buses due to heavy use.

One efficiency measure can be the amount of fuel used relative to passenger miles generated. This measures the fuel efficiency of transit.

Operating cost and subsidy per passenger mile are both indicators of cost efficiency of systems. Subsidy per passenger mile is affected by the fare policy of each system.

Compared to the 15 largest transit operators in the nation, the combined Los Angeles County transit systems are significantly over-utilized. The best measure of a transit system's passenger load is passenger miles per revenue bus mile. This indicates the average passenger load per bus. The SCRTD averaged 18.1 for this measure of service utilization, well ahead of New York which was in second place at 15.4. The average for the nation's largest 15 transit properties, excluding SCRTD, was 13.1. The Los Angeles County municipal systems compare very favorably to the nation's largest and most crowded systems, by averaging 12.8 passenger miles per bus mile.

When compared to the top 15 transit operators in the nation, Los Angeles County operators are doing an outstanding job. The

municipal operators with far fewer buses than any of the top 15 transit properties are carrying more boarding passengers than four of these major operators. In terms of annual passenger miles (the true measure of service used), they also perform better than two other major cities. The SCRTD boards more people on buses than all other cities with the exception of New York and Chicago. When passenger miles are considered, the SCRTD is number one, almost 15 percent ahead of New York City Transit Authority (NYCTA), and 68 percent ahead of Chicago Transit Authority.

Because of this high utilization rate, Los Angeles County is ranked high in boardings per hour, average loads, fuel efficiency and relatively lower cost and subsidy per passenger mile.

If the municipal operators' performance were compared as a unit to the largest 15 transit properties in the nation, they would compare very favorably. They would rank as follows:

Measure	Rank	Combined Muni Value	Group Avg.
Boarding per Revenue Hour	9th	44.3	46.1
Passenger Miles/Rev. Bus Miles	8th	12.8	13.1
Passenger Miles/Peak Bus	3rd	538,000	425,000
Passenger Miles/Gallon of Fuel	6th	41.2	36.7
Operating Cost/Psngr. Mile	2nd	$.31	$.46
Subsidy/Psngr. Mile	5th	$.23	$.22

The SCRTD also compares very favorably:

Measure	Rank	SCRTD Value	Group Avg.
Boarding per Revenue Hour	4th	57.6	46.1
Passenger Miles/Rev. Bus Miles	1st	18.1	13.1
Passenger Miles/Peak Bus	1st	824,000	425,000
Passenger Miles/Gallon of Fuel	1st	50.1	36.7
Operating Cost/Psngr. Mile	1st	$.29	.46
Subsidy/Psngr. Mile	4th	$.18	$.22

These comparative performance and utilization measures indicate that Los Angeles County transit operators as a whole are outstanding performers. In a service area that is extremely large and not noted for being attuned to transit, our municipal systems rank among the best in the nation. The SCRTD is ranked better than all the other major transit operators in having the highest average passenger loads, most passenger miles per gallon of fuel used, and the lowest operating cost per passenger mile.

However, these statistics, particularly the average passenger mile per bus mile, indicate that Los Angeles County is also significantly underserved.

Boardings Per Bus Hour

The District's boardings per hour of 57.6 is virtually the same as Chicago, Washington, D.C. and Philadelphia. Only New York with 62.1 is higher. The composite for the included municipal operators of 44.3 boardings per hour is only slightly below the average of 46 for the nation's 15 largest transit operators, excluding SCRTD.

Passenger Miles Per Bus Mile

This indicator of average load per bus trip shows that SCRTD buses have substantially heavier loads than any of the other major properties. The District's value of 18.1 is over 17 percent higher than NYCTA and nearly 40 percent over the weighted average for the national group. The Los Angeles County municipal operators have virtually the same value as the average for the major properties.

Passenger Miles Per Peak Bus

This is another statistic where the SCRTD is significantly above all other major transit operators. The District's 825,000 annual passengers per peak bus is 50 percent higher than second place Chicago. The Los Angeles County municipal operators are also doing an outstanding job in this measure. Their value of 539,000 is below only Chicago and SCRTD.

Passenger Miles Per Gallon of Fuel

Again, the SCRTD has significantly better performance than the other major transit properties. The District generated over 50 passenger miles per gallon of fuel which is 15 percent better than second place NYCTA and over 25 percent higher than the average for the other top 15 transit properties. Los Angeles County municipal operators average over 41 for this statistic, which is about 10 percent better than the average and are performing nearly as well as Chicago in this area.

Operating Cost Per Passenger Mile

The SCRTD leads the nation in the number of passenger miles generated. The SCRTD spreads its operating costs over nearly 1.7 billion passenger miles. At an operational cost of 29 cents per

passenger mile for SCRTD and 31 cents for the municipal operators, Los Angeles County is significantly better than any other national transit system. The average for the 15 largest system was 46 cents which is about 60 percent higher than SCRTD and above 50 percent higher than the municipal operators.

Subsidy Per Passenger Mile

Because the municipal systems offer relatively low passenger fares, their average subsidy per passenger mile of 23 cents is ranked fifth among the 15 largest systems. The SCRTD, even though it has a relatively high base fare, offers significant discounts so that the average fare collected is only about half the base fare. This also results in a subsidy per passenger mile of 18 cents, which ranked fourth among the 15 largest properties.

SCRTD Current Overloading Experience

Prior to the Proposition A reduced fare program between FY 1983 and FY 1985, the SCRTD was averaging about 1.1 million boardings and 53 boardings per hour on weekdays. Ridership increased during the reduced fare period to about 1.6 million boardings per weekday in FY 1985.

Presently, the system level passenger loads per bus are about the same as in FY 1985, the last year of the 50 cents reduced fare program. In FY 1985, the SCRTD averaged 71 boardings per revenue bus hour on weekdays. This was acknowledged as causing grossly excessive overloads. For the first four months of the present fiscal year, the SCRTD is averaging over 61. For September and October, this value was over 63.

This would seem to indicate that less overcrowding is now occurring than in FY 1985. However, since 1985 three factors have combined to result in FY 1985 and FY 1991 having equivalent crowding levels. These factors are longer passenger trip lengths, fewer seats per bus and slower bus speeds.

Compared to FY 1985, passengers are taking trips that are about 2.5 percent longer, from 3.93 miles in FY 1985 to 4.03 miles in FY 1991.

Because buses without wheelchair lifts have more seats and SCRTD has been aggressively phasing out non-wheelchair lift buses, the average number of seats per bus has been dropping. In FY 1985 the average was 45.1 seats per bus, now it is 43.5 seats per bus, a decline of 3.5 percent.

The largest single factor has been the decline in average bus speeds. Due primarily to increased traffic congestion, and the lack of bus preferential treatment, bus speeds have dropped from 13.2 mph to 12.3 mph, a decrease of 7.3 percent. In sum:

- Longer trip lengths mean passengers occupy seats longer;
- Fewer seats per bus mean more passengers must stand; and
- Slower bus speeds mean riders are on board for a longer time.

Due to these factors 63 boardings per hour in FY 1990 is equivalent to 71 in FY 1985 in terms of crowding. A better measure of crowding than boardings per bus hour is passenger miles per bus mile. This is an indication of the average passenger load. As stated earlier in this report, the average passenger miles per bus mile for the largest 15 bus transit systems in the nation was 13.1 in FY 1988. For FY 1985 the SCRTD averaged 21.3 passenger mile per bus miles for weekdays.

During the first four months of FY 1991, the SCRTD averaged about 20.7 passenger miles per bus mile. Adjusting the FY 1985 and early FY 1991 values for the average number of seats per bus results in .472 passenger per seat per mile in FY 1985 and .476 for FY 1991. This is another indication that overcrowding is now at those levels experienced during the reduced fare period.

For FY 1990, the latest year for which data is available for every line that the SCRTD operates, an analysis of overload conditions was conducted. During the AM and PM rush hours, over 2,400 bus trips were operated. Of these, nearly 1,000 or about 40 percent were overloaded. It is estimated that about 50 to 75 additional buses would have been required to bring all SCRTD lines into compliance with its loading standards in FY 1990.

Given that weekday patronage has increased about 5 percent in FY 1991, the present estimate of additional buses required to meet the loading standard is 100 to 125. Even if 125 buses were each operated for 16 per hours weekday, the passenger miles per bus mile factor would fall from 20.7 to about 19.0. Adding current weekend service and patronage levels to this would lower this measure to about 18.5. This is still about 20 percent higher than the NYCTA's bus system in FY 1988.

Load Factors

In general, transit headways (minutes between buses) and frequency (bus trips per hour) are determined either by actual ridership levels or by an established minimum service policy. Those lines scheduled to meet ridership levels are known as "demand" lines, while lines operating a minimum service regardless of patronage are known as "policy" lines. Every transit operator has adopted loading standards which are used to determine the appropriate number of bus trips to schedule to meet passenger demand. Many properties also have policies which also mandate a minimum level of service that must be operated on routes regardless of ridership. For the SCRTD this "policy headway" is 60 minutes. For other major properties such as Chicago, it is 30 minutes while for New York it is 20 minutes.

On lines that generate enough ridership to warrant service levels better than the policy minimums, the loading standards are used to schedule service on a demand basis.

Table 4 lists the loading standards for New York, Chicago and SCRTD. These loading standards are similar in structure. The load factor varies by time of day and frequency of service. A review of these tables shows that during the peak periods, New York and Chicago load only their most frequent services (about every five minutes or better) to levels as high as the SCRTD. When trip time intervals are increased to about every six minutes or more, then New York and Chicago place far fewer people on each bus than does the SCRTD. This becomes very pronounced when service levels are 15 minutes or worse. While the SCRTD is still scheduling for 17 standees per trip, the other two major properties are scheduling for empty seats. At 20-minute intervals, the SCRTD has 17 standees, Chicago has nine empty seats and New York has 13 empty seats.

It should also be noted that Chicago and New York use their peak-load standards for the highest 30-minute demand period and the remainder of the peak period is "feathered" into the lower midday or night standards. By contrast, the SCRTD maintains its standards for the entire three-hour peak period.

As reported by LACTC staff, many of the Los Angeles County municipal operators also have very high loading standards, as listed below:

Santa Monica	-	Maximum load factor is 150% of seated capacity for a distance of two miles or more (peak period).
Culver City	-	Not to exceed 150% of seated capacity on more than two trips per line per peak period.
Torrance	-	Shall not exceed 140% of seated capacity on more than three consecutive runs.
Gardena	-	Not to exceed 140% of number of seats on three consecutive buses.
Long Beach	-	Not to exceed 140% of number of seats on three consecutive buses.

The actual ridership levels relative to policy standards for SCRTD and the municipal operators will be presented in the second phase of this report in March.

Potential Actions

Compared to the largest transit operators in the nation and especially when compared to the major properties within the state, SCRTD and many municipal operators are not providing enough service. The indications are that overloading, relative to other large transit systems, is occurring on several Los Angeles County transit providers.

Several potential actions can be taken to reduce overloading. These actions, which will be discussed in detail in the March report, include but are not limited to the following:

- Redeploy existing vehicles from low demand lines on system
- Modify load factor policies
- Increase dedicated street/freeway transit capacities (HOV lanes, reverse lanes, bus only streets)
- Implement peripheral parking strategies
- Fund additional transit service

CONCLUSION

Compared to the largest 15 national transit operators, the SCRTD performs extremely well. It is ranked number one in average passenger load, fuel efficiency, and passenger utilization. It also ranks within the top four in terms of cost and subsidy per passenger mile.

The municipal operators of Los Angeles County are also performing very well when their average is compared to the other major operators.

These facts, in particular the average passenger load, indicate that more transit service is needed in the county. The SCRTD and several municipal transit systems are performing at or near the top in statistics that relate to utilization while comparing very well in cost efficiency. It may be possible to slightly improve these factors by increasing the average number of boardings and passenger miles per bus. However, given that these factors are already at or among the highest in the nation, improvements in these statistics could lead to service quality problems.

The March phase two report will contain specific steps that can be taken to identify problems and recommend remedial actions. In the meantime, the SCRTD is preparing a report that lists overloads and underloads on all its lines. The LACTC staff will obtain data for FY 1990 for the municipal operators and prepare a contract for a consultant to evaluate the municipal overload and underload situation as it exists this year.

Respectfully,

Neil Peterson

Alan F. Pegg

Attachments

TABLE 1

TRANSIT SYSTEMS SELECTED FOR COMPARISON

15 LARGEST TRANSIT SYSTEMS IN U.S. RANKED BY PASSENGER BOARDINGS

New York - NYTA
Chicago - CTA
Los Angeles - SCRTD
Washington, D.C. - WMATA
Philadelphia - SEPTA
Seattle Metro
Minneapolis - MTC
Boston - MBTA
Pittsburgh - PAT
Baltimore - MTA
Houston - MTA
Denver - RTD
St Louis - Bi State
Atlanta - MARTA
Dallas - DART

LOS ANGELES COUNTY MUNICIPAL SYSTEMS RANKED BY PASSENGER BOARDINGS

Long Beach
Santa Monica
Gardena
Montebello
Torrance
Culver City
Norwalk
City of Commerce

TABLE 2

FY 88 SECTION 15 DATA

15 LARGEST TRANSIT SYSTEMS

TRANSIT SYSTEM	Passengers per Revenue Bus Hour	Passenger Miles per Rev Bus Mi	Passenger Miles per Peak Bus	Passenger Miles per Gallon Fuel	Operating Cost per Passenger	Operating Cost per Psgr Mile	Subsidy per Passenger	Subsidy per Psgr Mile	Peak Buses	Annual Brdgs. (000)	Annual Psgr. Mi. (000)	
Los Angeles-SCRTD	57.6	18.1	824.6	50.1	$1.16	$0.29	$0.718	$0.176	2040.0	424646.1	1682210.3	SCRTD
Los Angeles-Muni. Ops.	44.3	12.8	538.5	41.2	$1.06	$0.31	$0.797	$0.229	364.0	57450.2	196019.5	MUNI OPS
New York CTA	62.1	15.4	464.3	43.6	$1.30	$0.63	$0.659	$0.318	3174.0	710342.3	1473710.4	NYCTA
Chicago-CTA	58.3	13.5	547.6	41.7	$0.89	$0.38	$0.360	$0.154	1830.0	430089.5	1002108.4	CTA
Washington, D.C.-WMATA	58.7	14.3	406.0	33.9	$1.61	$0.48	$0.923	$0.276	1371.0	166379.2	556643.6	WMATA
Philadelphia-SEPTA	57.1	15.1	460.0	37.0	$0.92	$0.34	$0.250	$0.093	1110.0	189790.3	510555.0	SEPTA
Seattle Metro	36.4	14.6	396.7	43.2	$2.25	$0.36	$1.845	$0.292	859.0	53907.2	340744.8	Metro
Minneapolis MTC	45.7	11.5	299.2	36.1	$1.38	$0.40	$0.940	$0.270	827.0	71233.1	247455.5	Minn
Boston-MBTA	54.5	10.2	294.0	30.3	$1.38	$0.62	$0.987	$0.444	814.0	107570.0	239310.0	MBTA
Pittsburgh-PAT	38.7	11.8	403.0	31.1	$1.50	$0.38	$0.951	$0.240	762.0	77415.7	307116.4	PAT
Baltimore-MTA	55.9	15.2	435.4	42.1	$0.97	$0.32	$0.440	$0.144	733.0	104883.9	319113.9	Balt
Houston-MTA	33.8	12.1	498.8	35.7	$1.85	$0.37	$1.382	$0.276	698.0	69421.7	348195.0	Houston
Denver-RTD	37.9	9.1	354.9	30.6	$1.92	$0.46	NA	NA	603.0	51240.6	213990.8	Denver
St Louis-Bi-State	34.3	9.5	304.4	27.2	$1.95	$0.48	NA	NA	597.0	45089.0	181743.6	Bi-State
Atlanta-MARTA	41.9	10.4	465.8	27.7	$1.19	$0.36	$0.870	$0.266	578.0	82297.3	269257.0	MARTA
Dallas Area Rapid Tr	40.5	9.2	283.2	22.9	$2.26	$0.72	$1.730	$0.549	539.0	48479.6	152650.7	Dallas
WTO AVG (excluding SCRTD)	46.1	13.1	425.2	36.7	$1.30	$0.46	$0.621	$0.222	1035.4	157724.2	440185.4	

TABLE 3

FY 88 SECTION 15 DATA

L.A. COUNTY INCLUDED MUNICIPAL SYSTEMS

TRANSIT SYSTEM	*Passengers* per Revenue Bus Hour	*Passenger* Miles per Rev Bus Mi	*Passenger* Miles per Peak Bus	*Passenger* Miles per Gallon Fuel	Operating Cost per Passenger	Operating Cost per Psgr Mile	Subsidy per Passenger	Subsidy per Psgr Mile	Peak Buses	Annual Bdrdgs. (000)	Annual Psgr. Mi. (000)	
Los Angeles-SCRTD	57.6	18.1	824.6	50.1	$1.16	$0.29	$0.718	$0.176	2040.0	424646.1	1682210.3	SCRTD
Los Angeles-Muni. Ops.	44.3	12.8	538.5	41.2	$1.06	$0.31	$0.797	$0.229	364.0	57450.2	196019.5	MUNI OPS
Long Beach PTC	42.3	10.7	484.4	33.3	$1.20	$0.40	$0.978	$0.298	130.0	21232.1	62971.0	LB
Santa Monica Muni Bus	64.7	17.7	585.5	51.4	$0.71	$0.21	$0.403	$0.118	106.0	18194.8	62059.8	SM
Gardena-Municipal Bus	42.5	14.2	585.6	53.6	$1.28	$0.27	$1.008	$0.249	31.0	3781.6	18153.0	Gard
Montebello Muni Bus Lines	53.3	14.4	685.9	46.8	$0.82	$0.26	$0.581	$0.187	29.0	6393.8	19890.4	Mont
City of Torrance TS	24.8	10.6	567.3	39.6	$2.07	$0.36	$1.639	$0.289	28.0	2796.8	15885.6	Torr
Culver City Muni Bus Line	44.4	12.4	542.2	37.7	$1.05	$0.33	$0.771	$0.257	18.0	3088.7	9760.4	CC
Norwalk TS	21.8	4.8	218.3	18.0	$2.25	$0.75	$2.018	$0.672	16.0	1163.9	3493.2	Norwalk
City of Commerce	68.8	18.5	634.4	83.2	$1.21	$0.25	$1.215	$0.255	6.0	798.5	3806.1	Comm
WTD AVG (excluding SCRTD)	44.3	12.8	538.5	41.2	$1.06	$0.31	$0.797	$0.229				
SUM (excluding SCRTD)									364.0	57450.2	196019.5	

TABLE 4

COMPARISION OF PASSENGER LOADING STANDARDS

LOS ANGELES - SCRTD - All Routes

HEADWAY (Minutes)	WEEKDAY PEAKS	WEEKENDS AND MIDDAY	NIGHTS	EXPRESS
1 - 10	145%	120%	110%	110%
11 - 20	140%	110%	100%	100%
21 - 30	120%	100%	90%	90%
31 - 60	100%	90%	75%	75%

CHICAGO - CTA -- Downtown/Feeder Routes

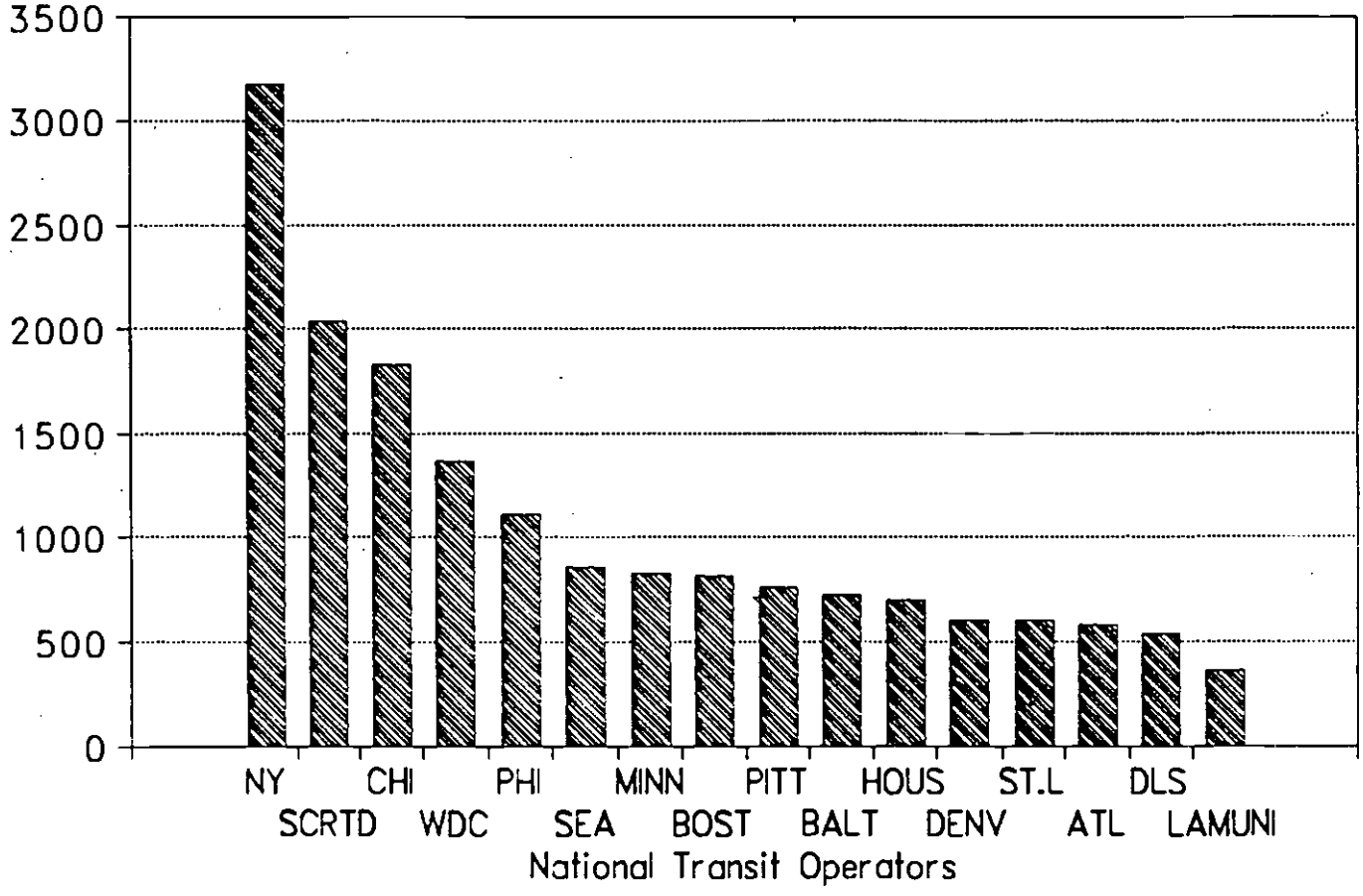
HEADWAY (Minutes)	WEEKDAY PEAKS	WEEKENDS AND MIDDAY	NIGHTS	EXPRESS
1 - 4	150%	90%	80%	50%
5	140%	90%	80%	50%
6	130%	90%	80%	50%
7-1/2	120%	80%	70%	50%
10	110%	70%	60%	50%
12	100%	60%	50%	50%
15	90%	50%	50%	50%
20	80%	40%	40%	40%
30	60%	40%	40%	30%
60	--		--	30%

NEW YORK - NYCTA -- Grid Routes

HEADWAY (Minutes)	WEEKDAY PEAKS	WEEKENDS AND MIDDAY	NIGHTS	EXPRESS
1 - 6	145%	95%	85%	--
7-1/2	130%	85%	70%	--
10	120%	70%	50%	35%
12	107%	67%	35%	35%
15	95%	60%	35%	35%
20	70%	60%	35%	35%
30	--	--	--	25%

GRAPH 1

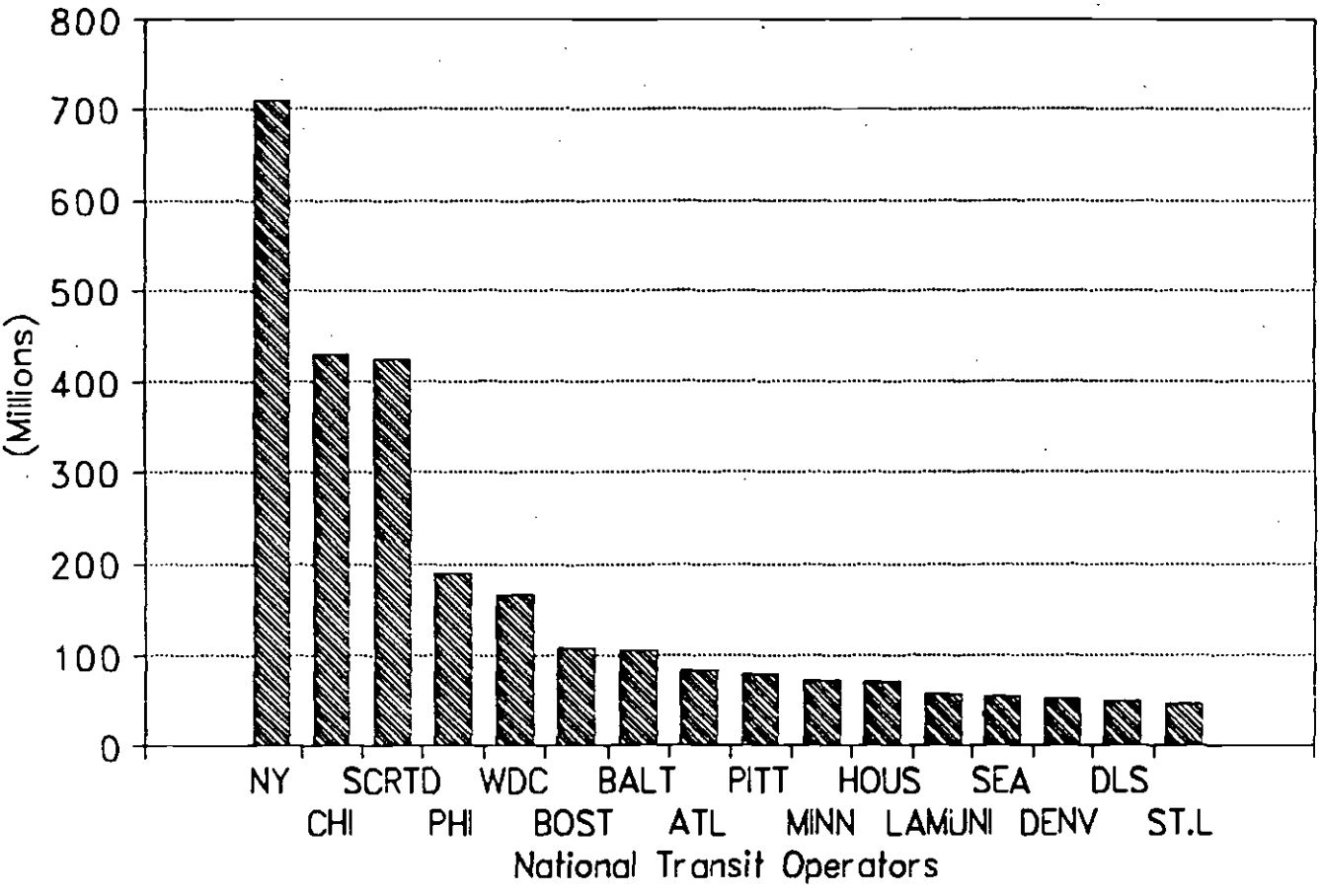
PEAK BUSES
Fiscal Year 1988



GRAPH 2

ANNUAL BOARDINGS

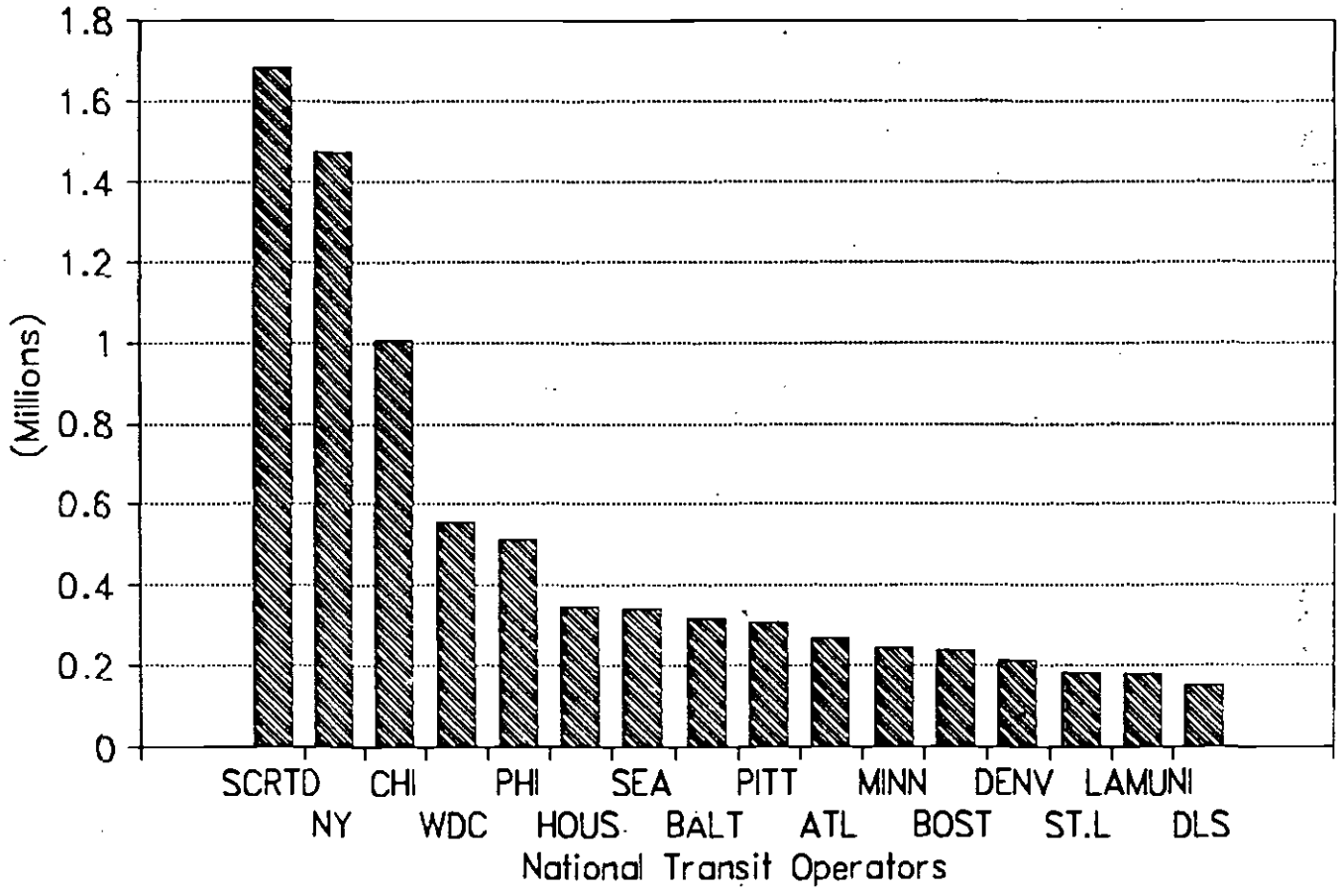
Fiscal Year 1988



GRAPH 3

ANNUAL PASSENGER MILES

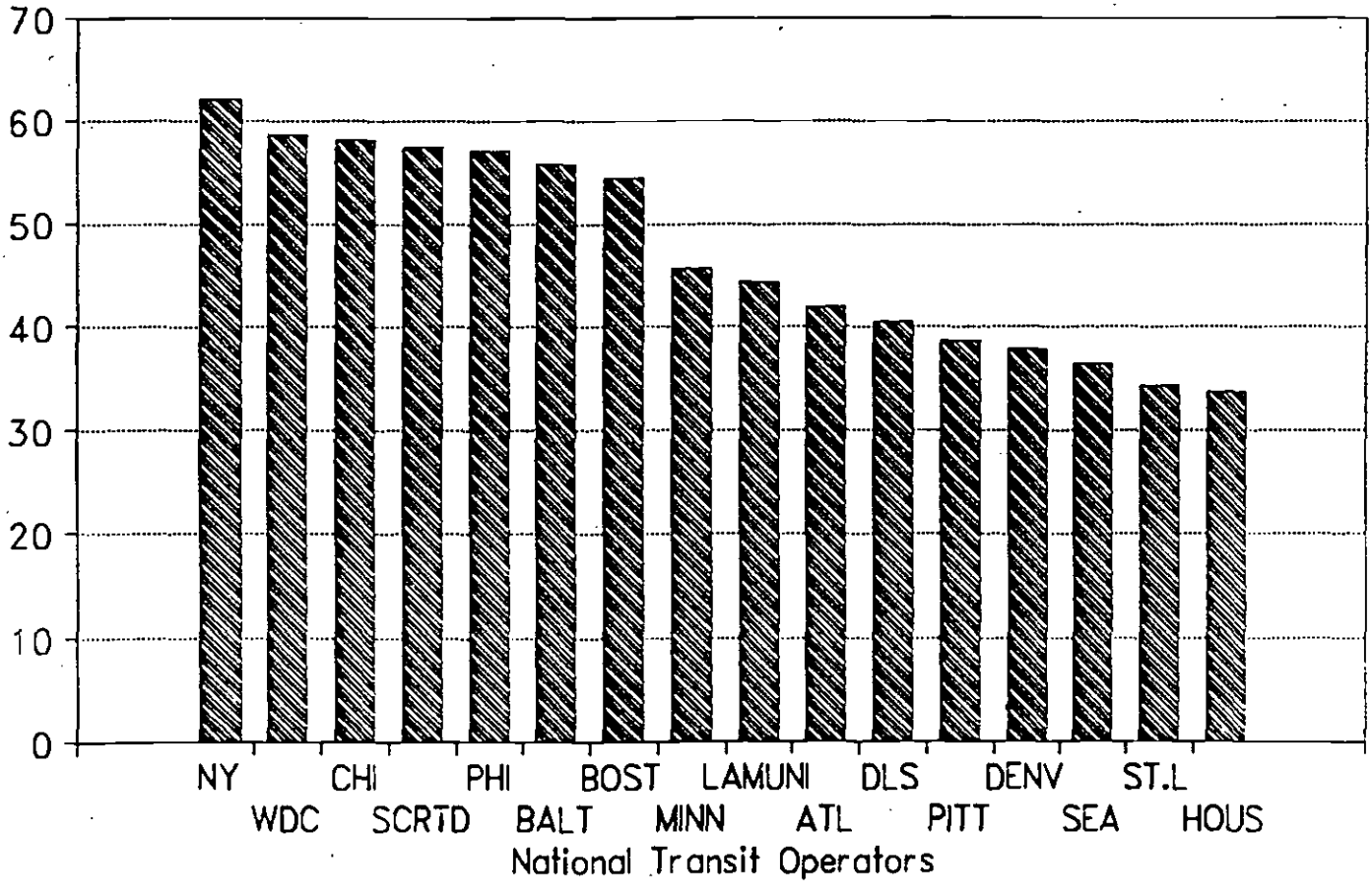
Fiscal Year 1988



GRAPH 4

PASSENGERS/REVENUE BUS HOUR

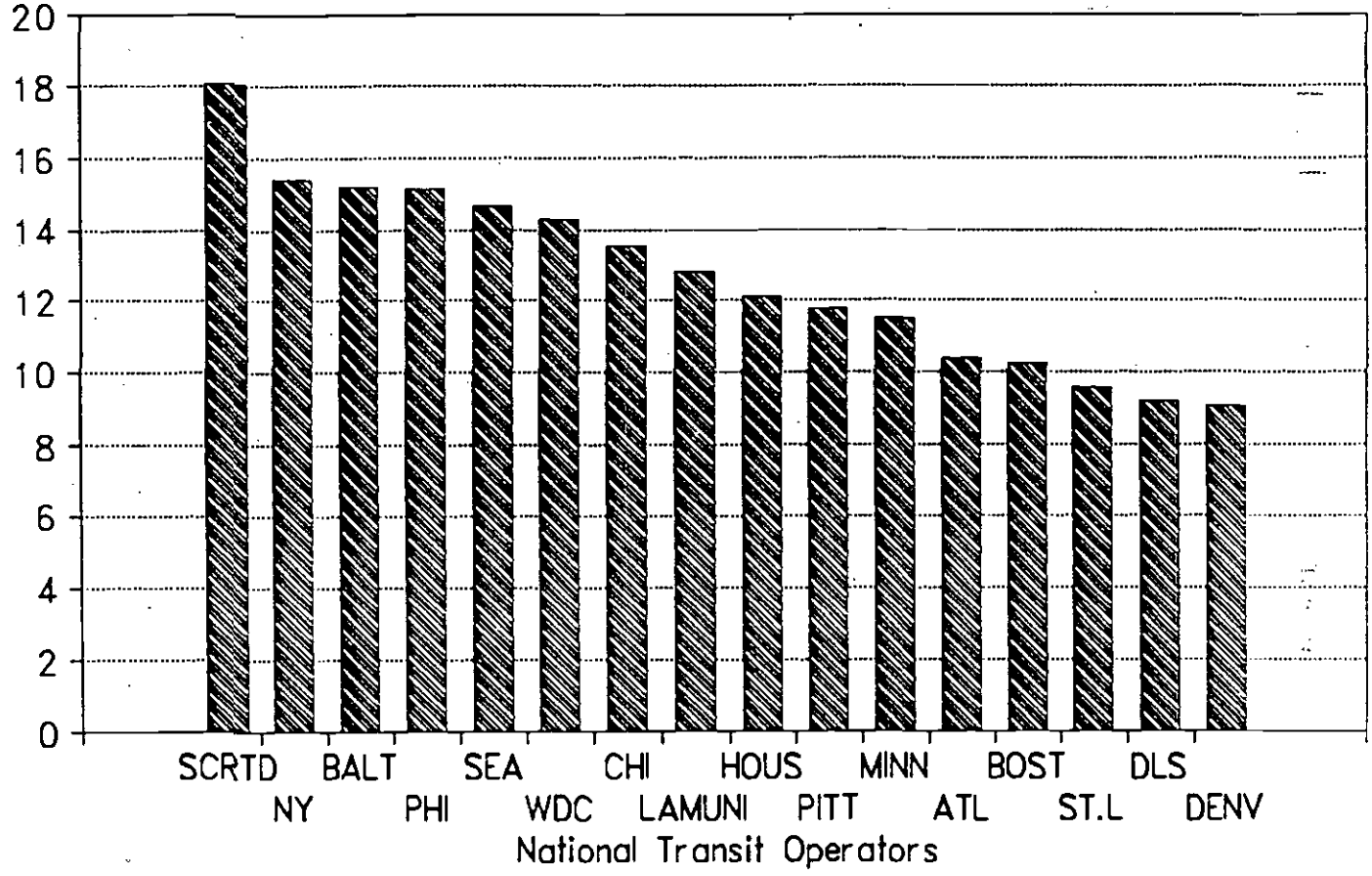
Fiscal Year 1988



GRAPH 5

PASSENGER MILES/REV. BUS MILE

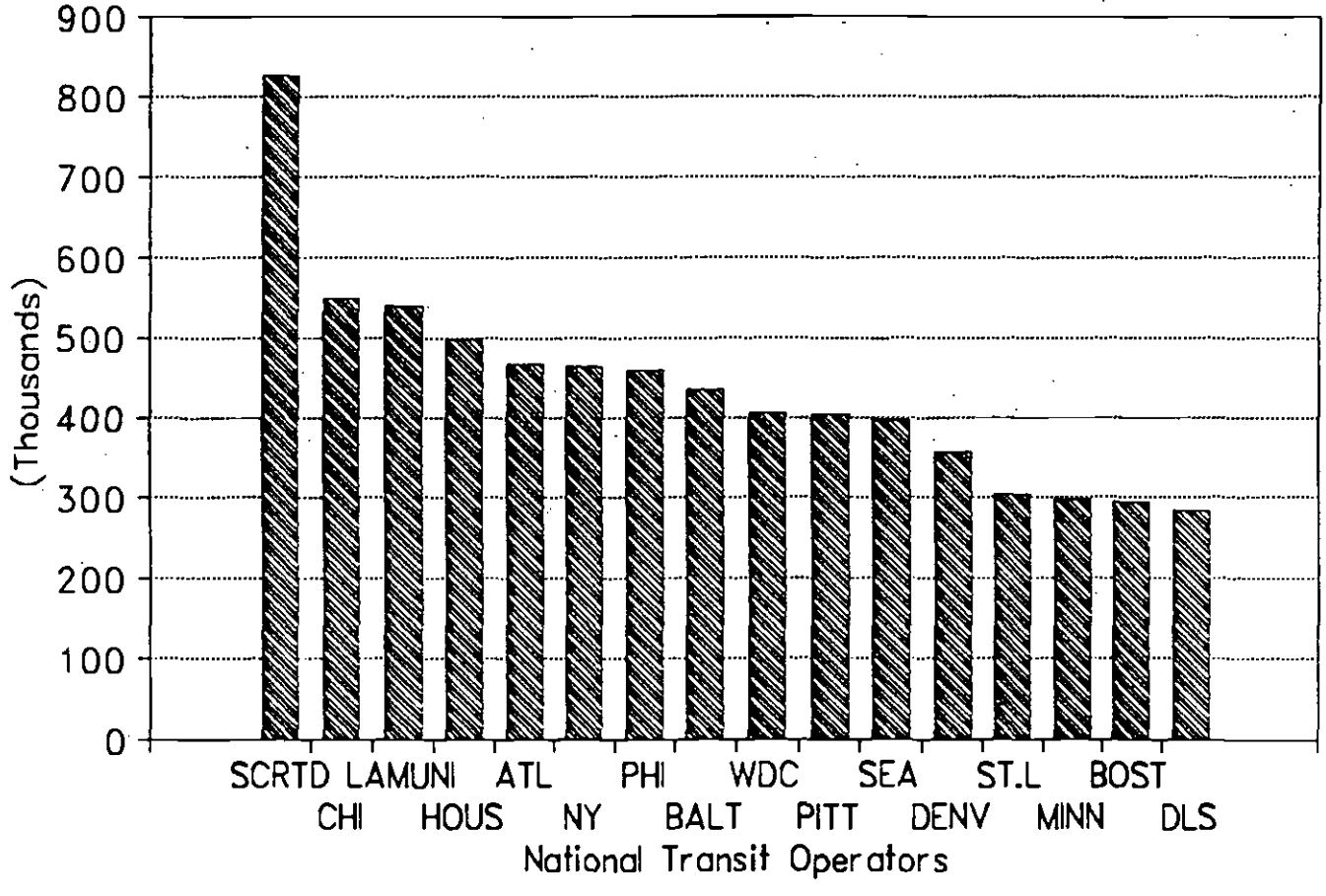
Fiscal Year 1988



GRAPH 6

PASSENGER MILES/PEAK BUS

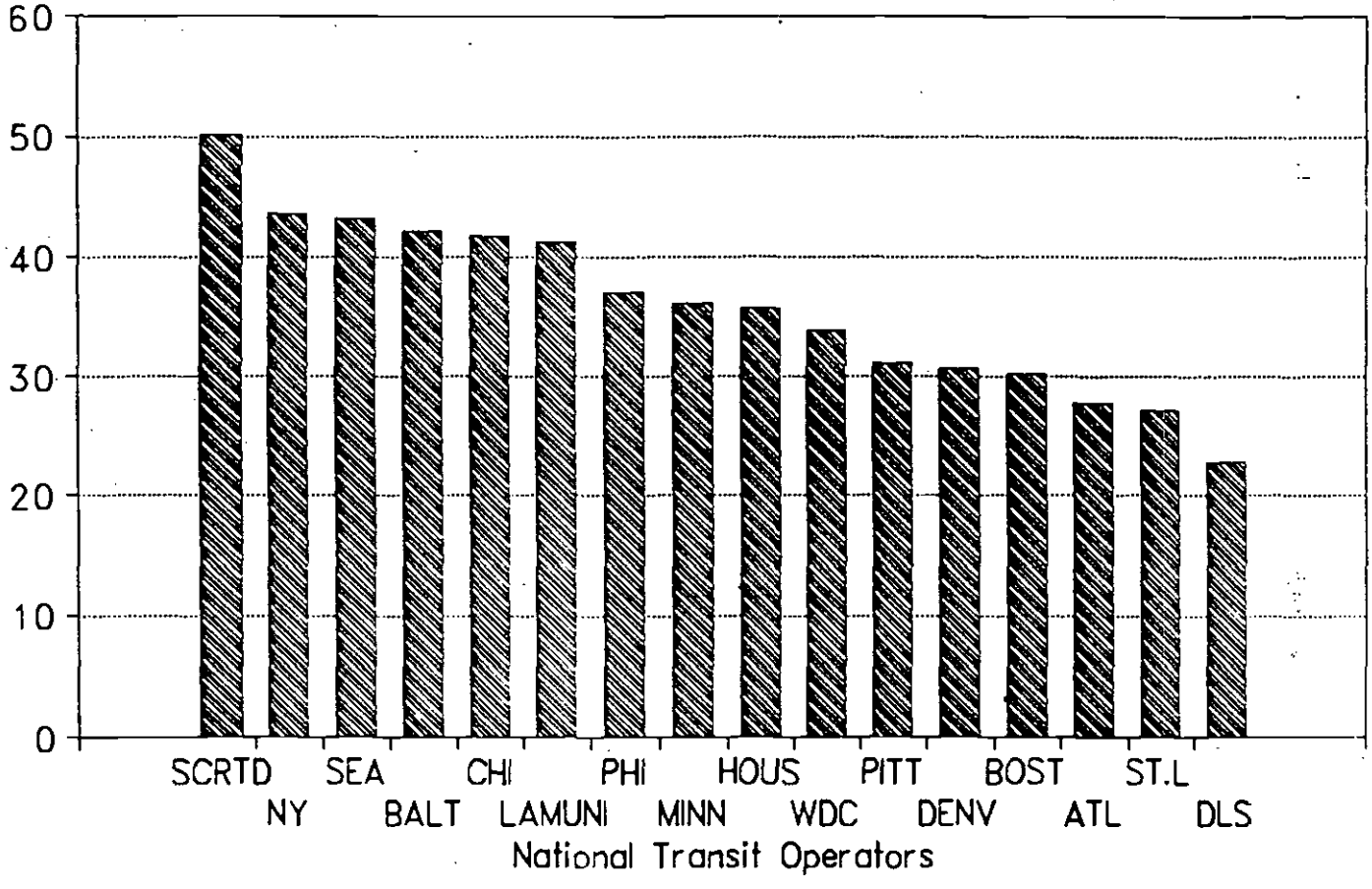
Fiscal Year 1988



GRAPH 7

PASSENGER MILES/GALLON FUEL

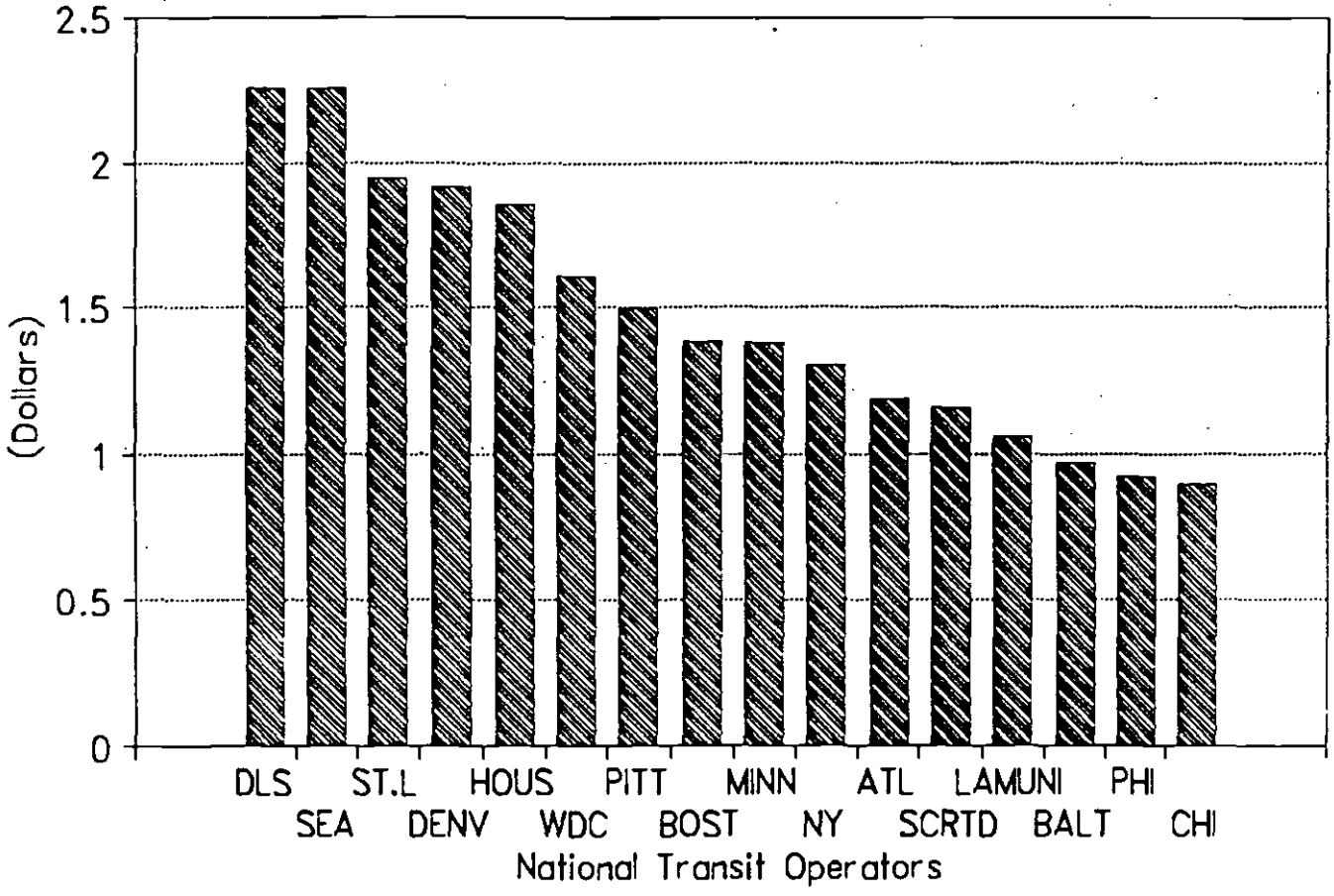
Fiscal Year 1988



GRAPH 8

OPERATING COST PER PASSENGER

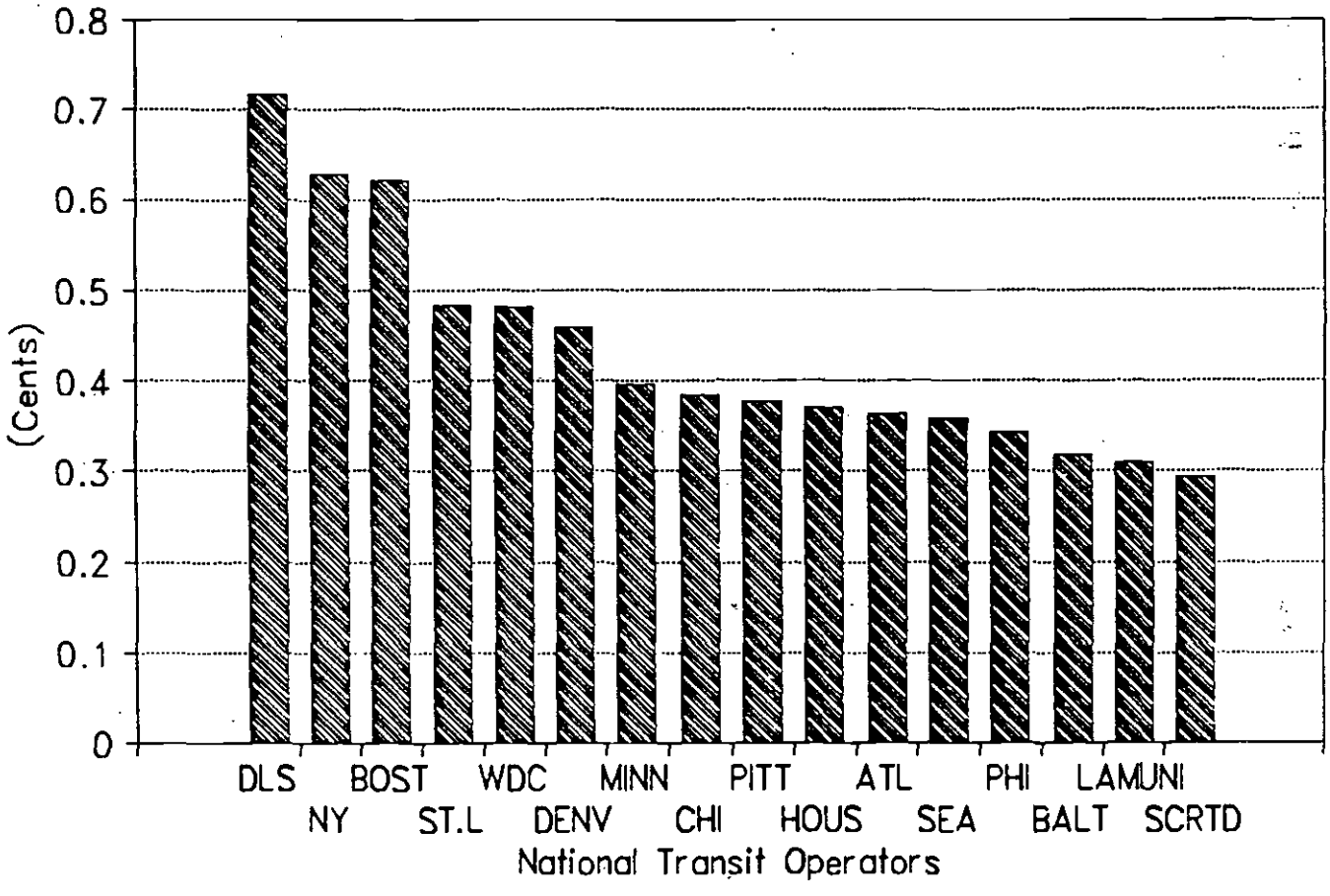
Fiscal Year 1988



GRAPH 9

OPERATING COST/PASSENGER MILE

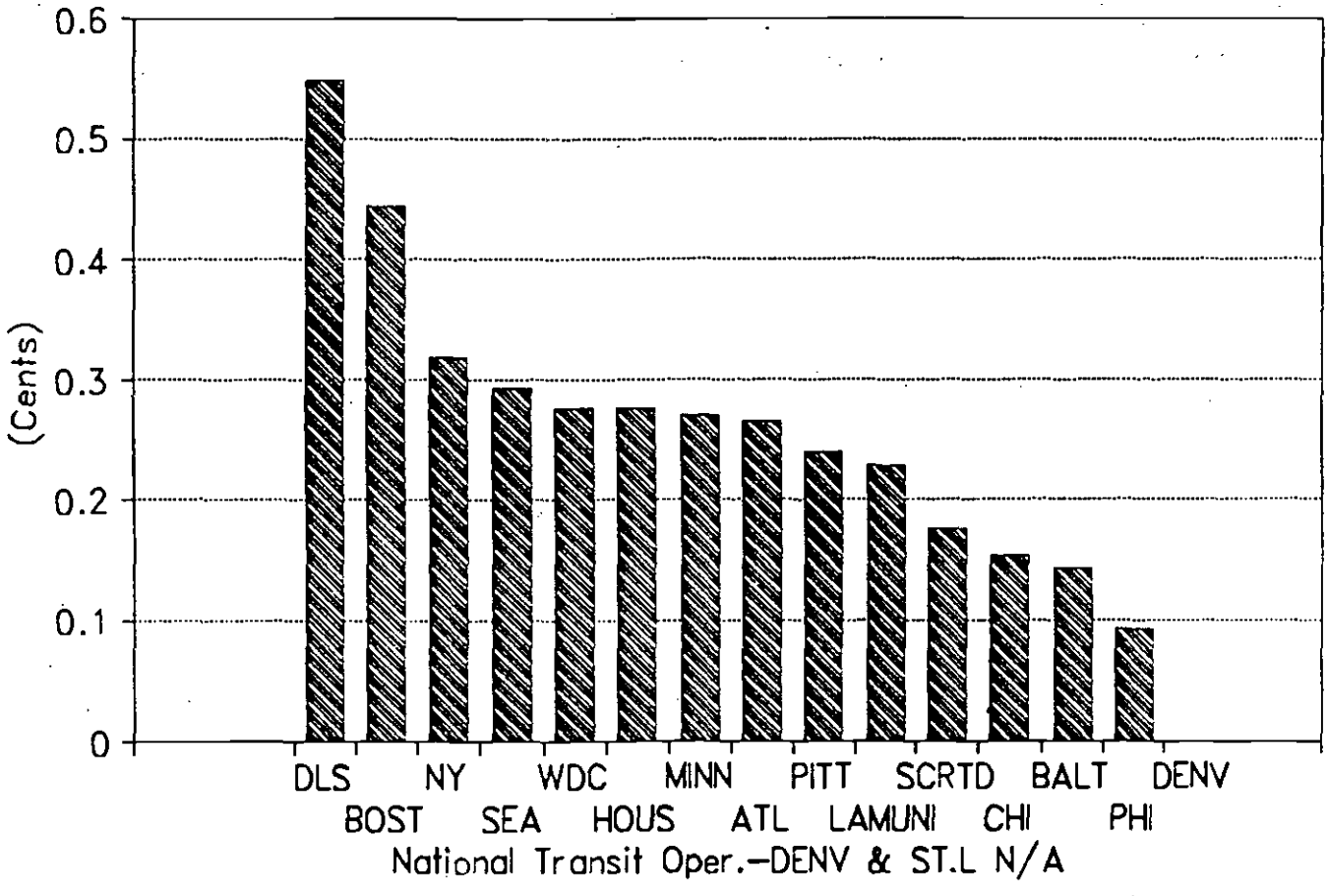
Fiscal Year 1988



GRAPH 10

SUBSIDY PER PASSENGER MILE

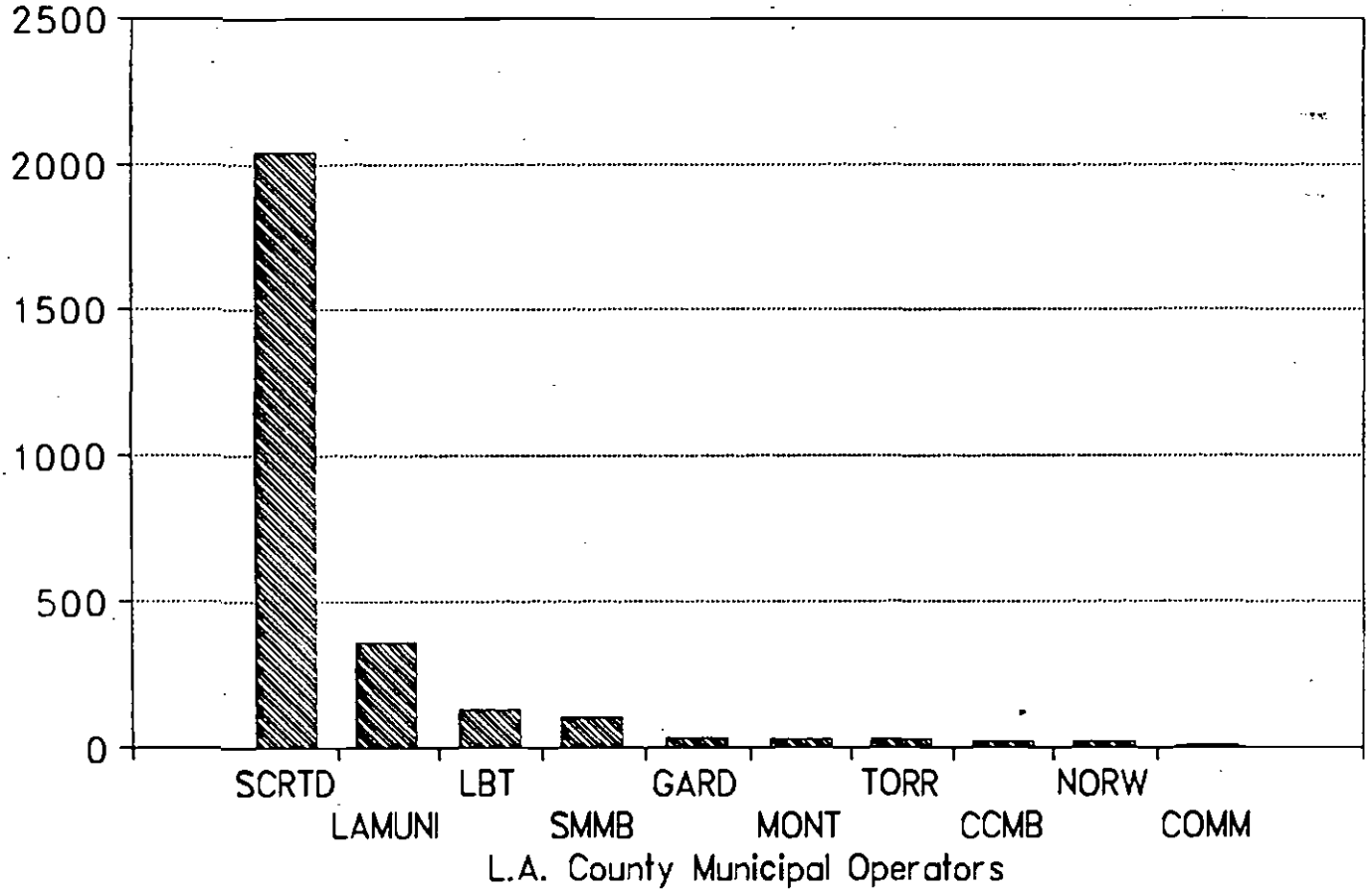
Fiscal Year 1988



National Transit Oper.–DENV & ST.L N/A

GRAPH 11

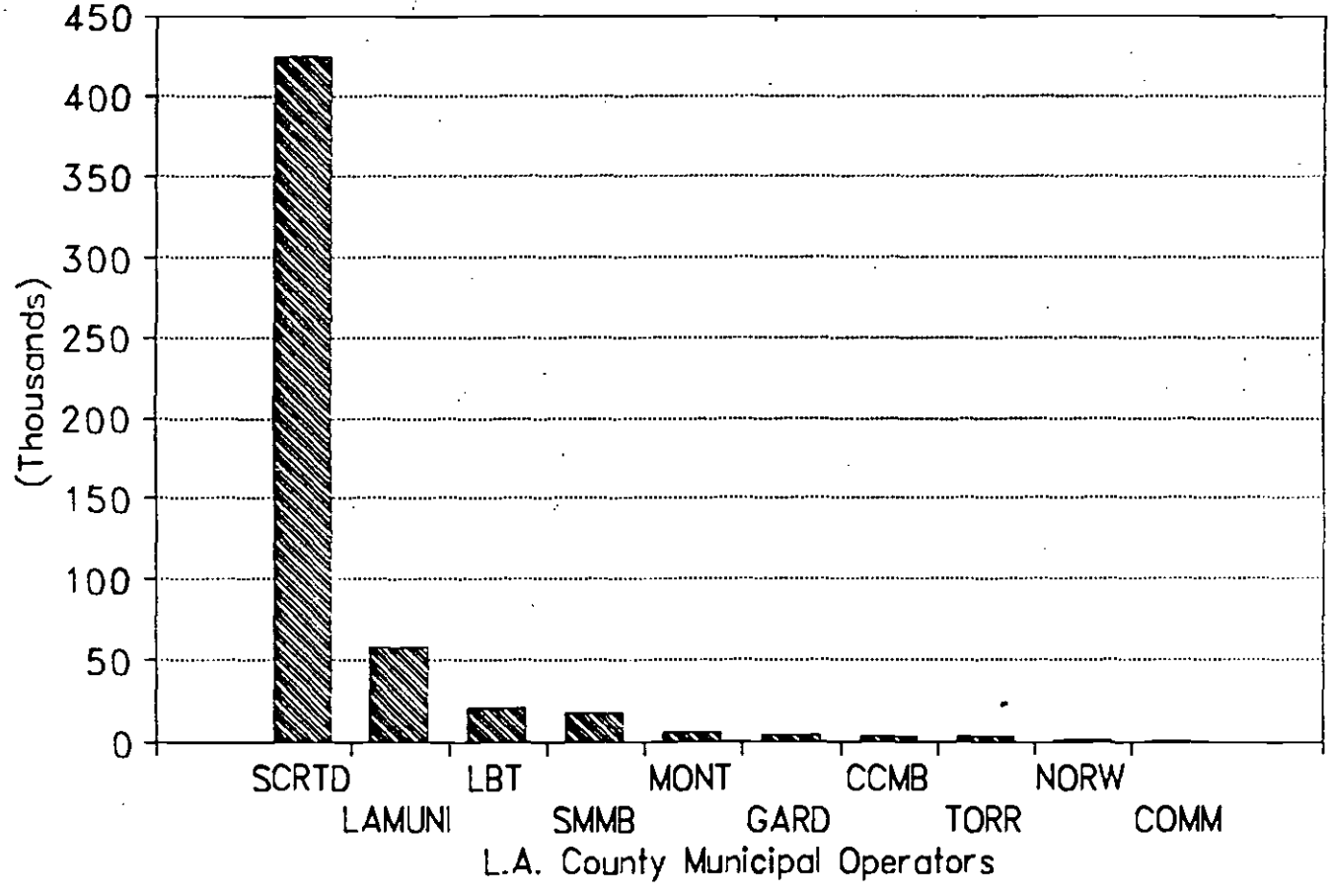
PEAK BUSES
Fiscal Year 1988



GRAPH 12

ANNUAL BOARDINGS

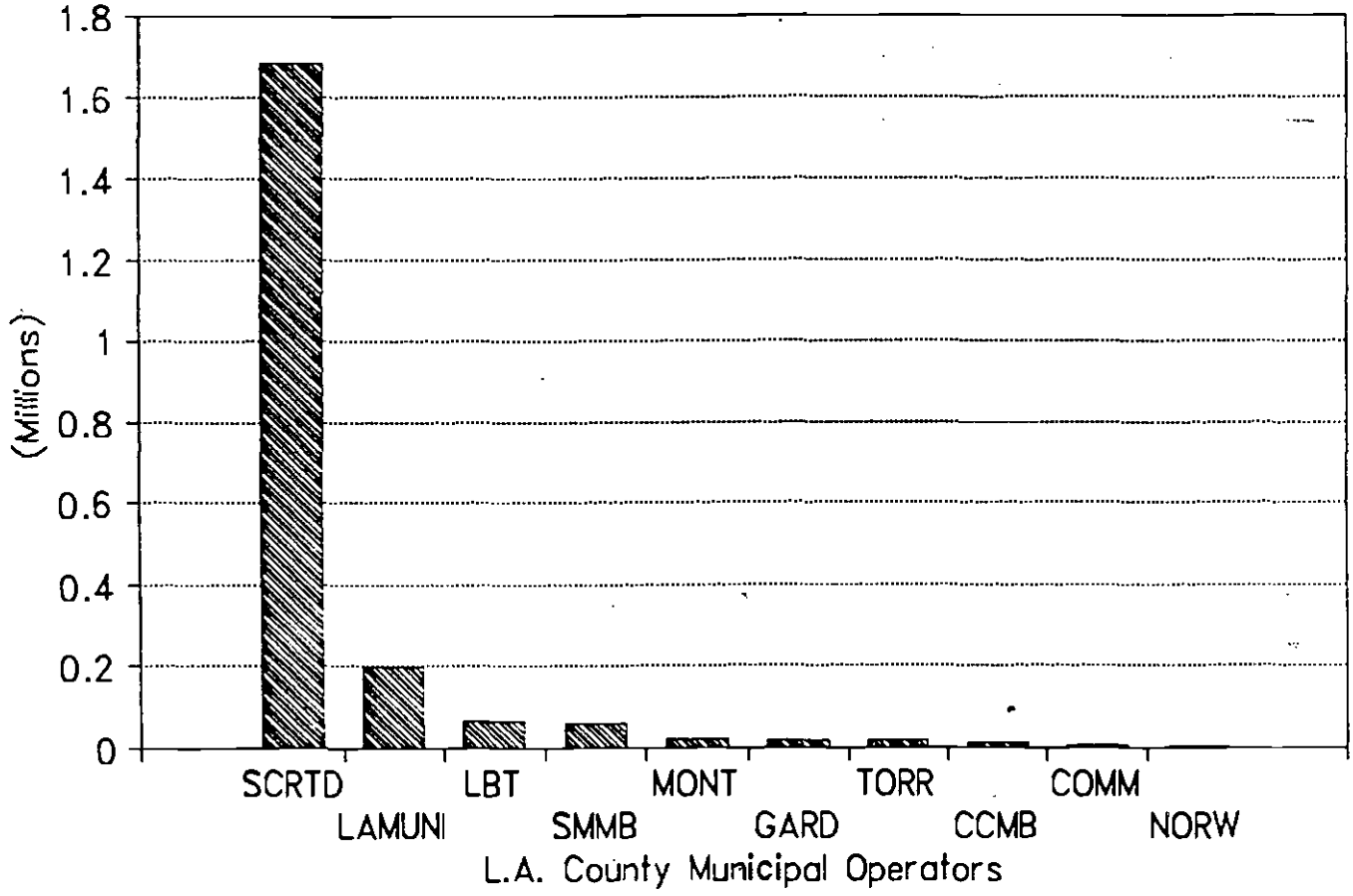
Fiscal Year 1988



GRAPH 13

ANNUAL PASSENGER MILES

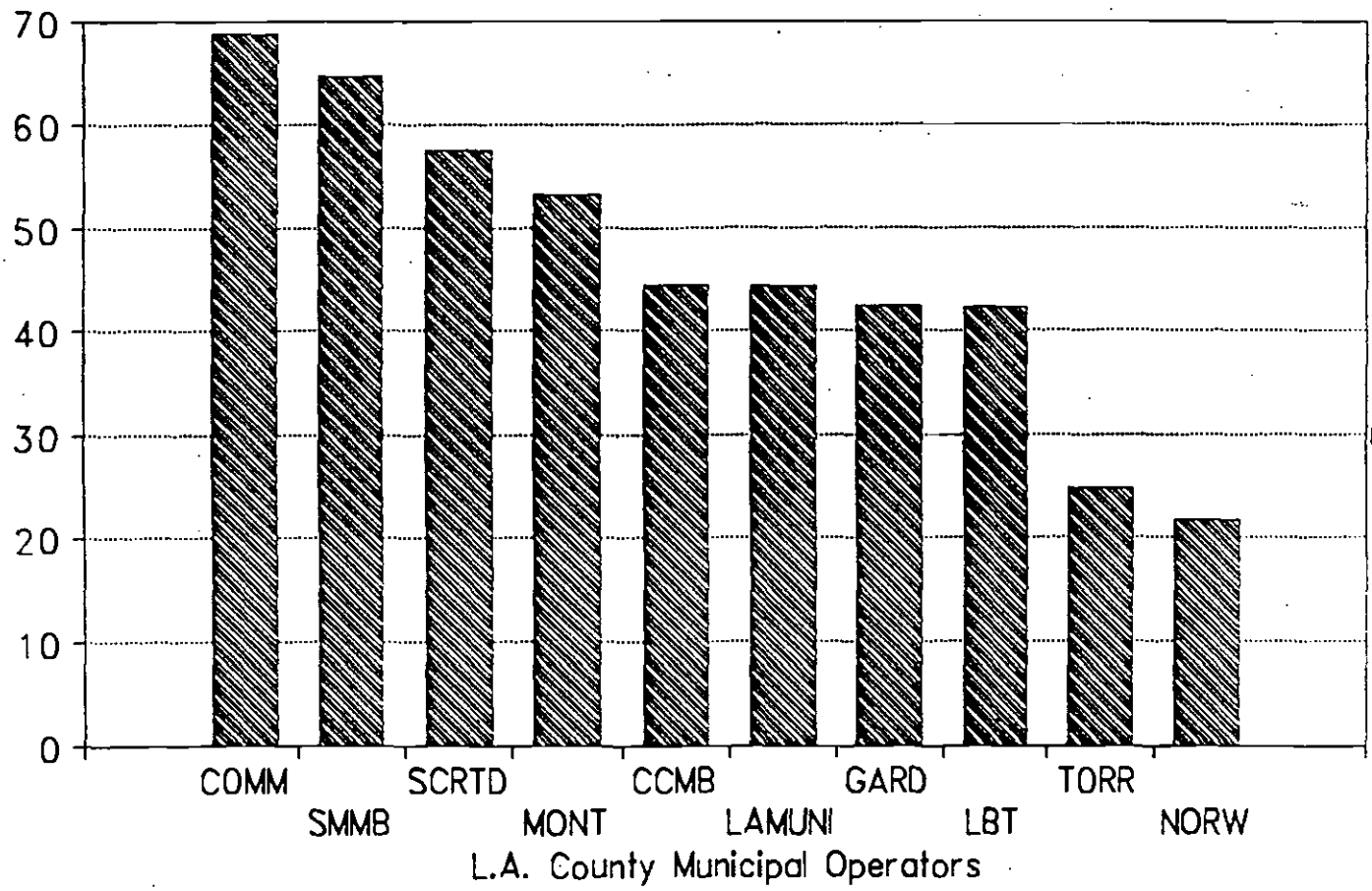
Fiscal Year 1988



GRAPH 14

PASSENGERS/REVENUE BUS HOURS

Fiscal Year 1988

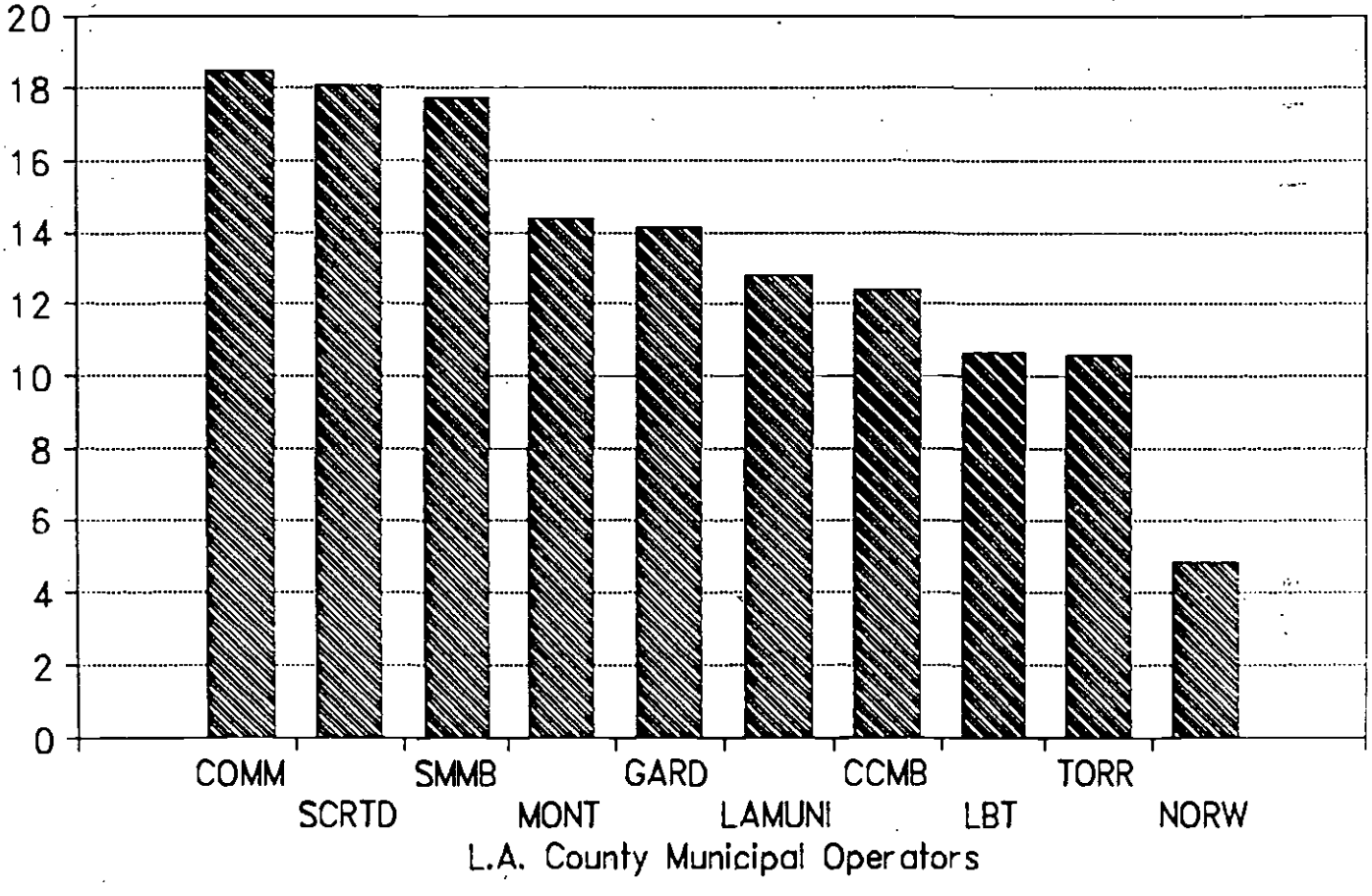


L.A. County Municipal Operators

GRAPH 15

PASSENGER MILES/REVENUE BUS MILES

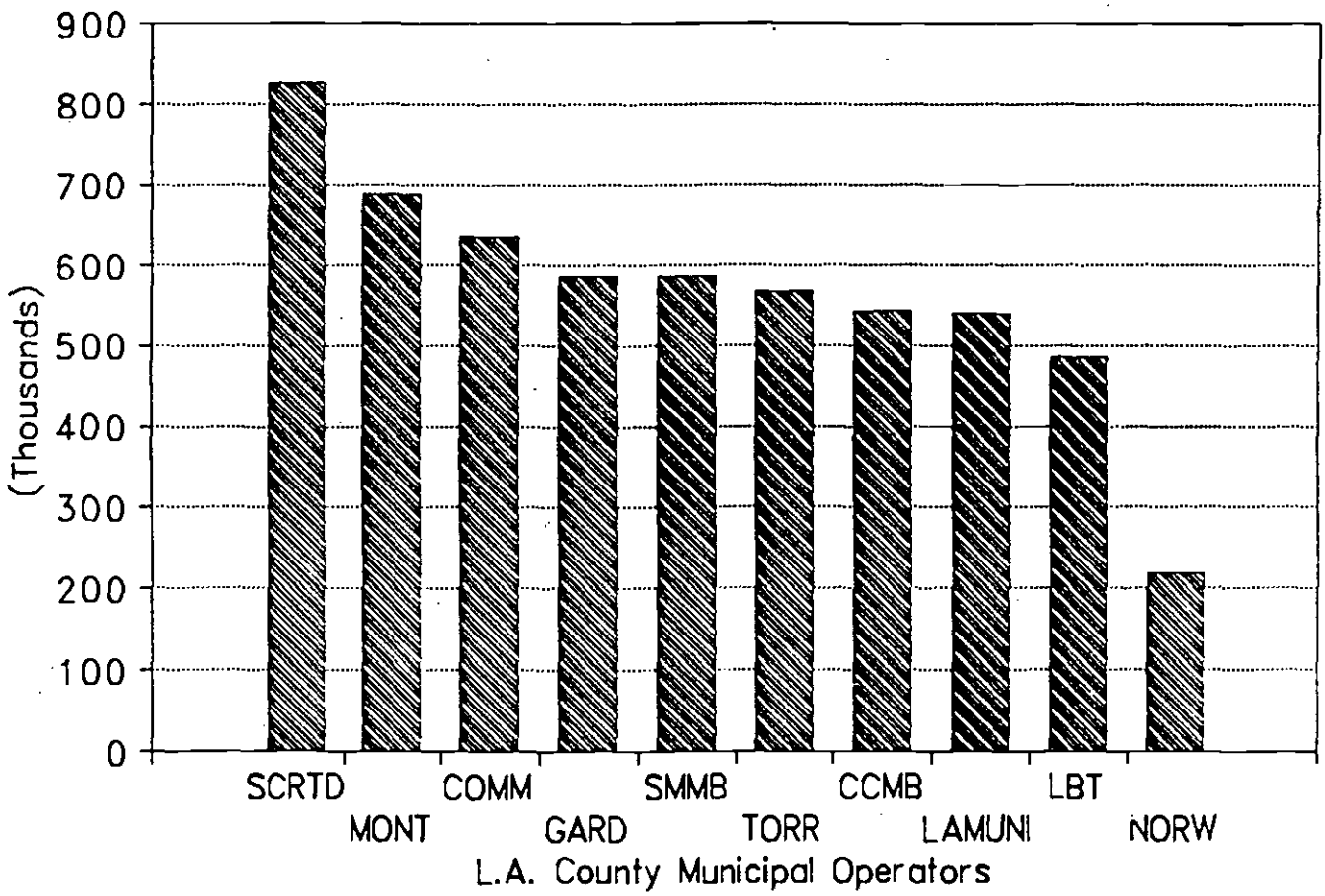
Fiscal Year 1988



GRAPH 16

PASSENGER MILES/PEAK BUS

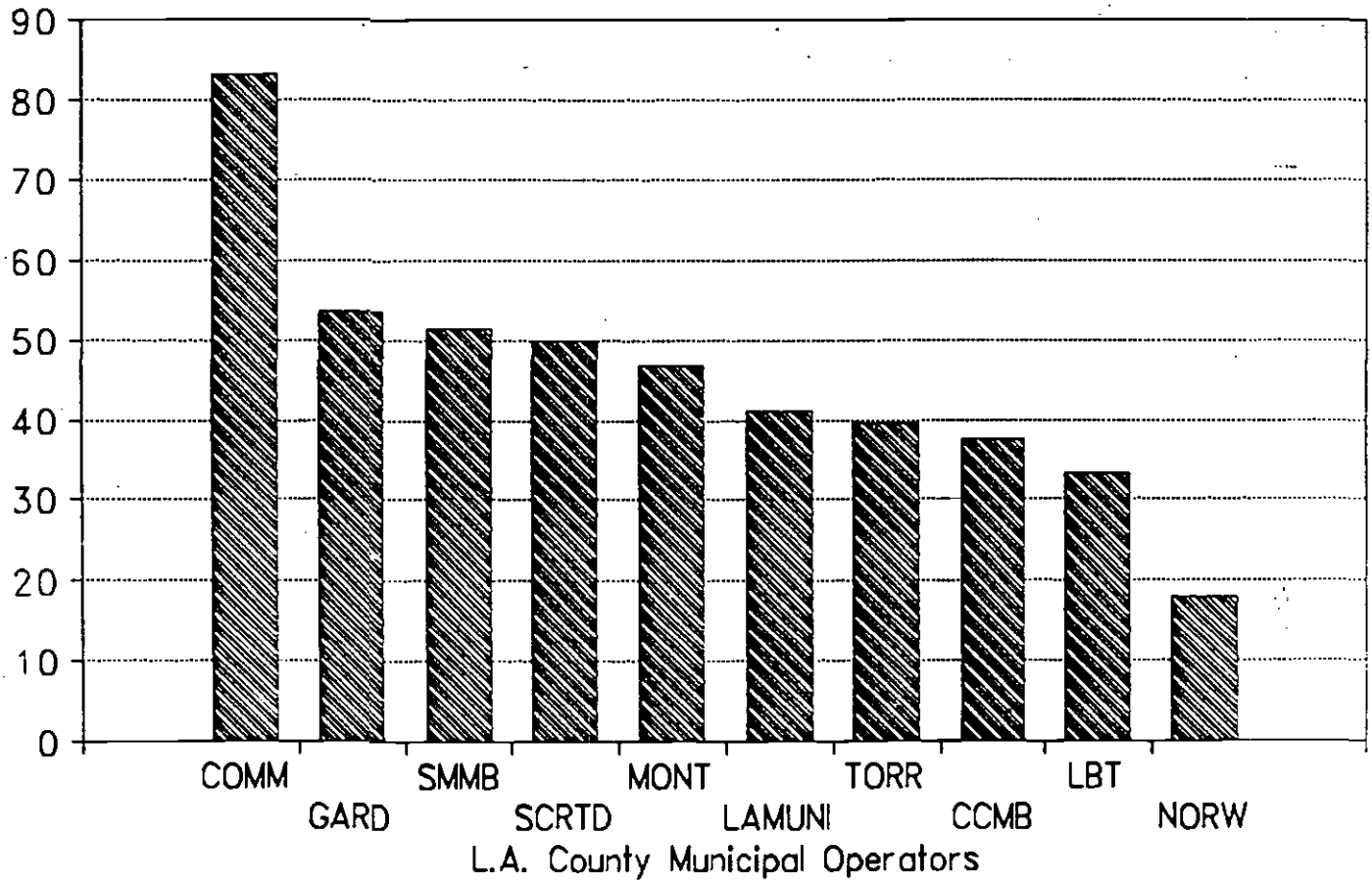
Fiscal Year 1988



GRAPH 17

PASSENGER MILES/GALLON FUEL

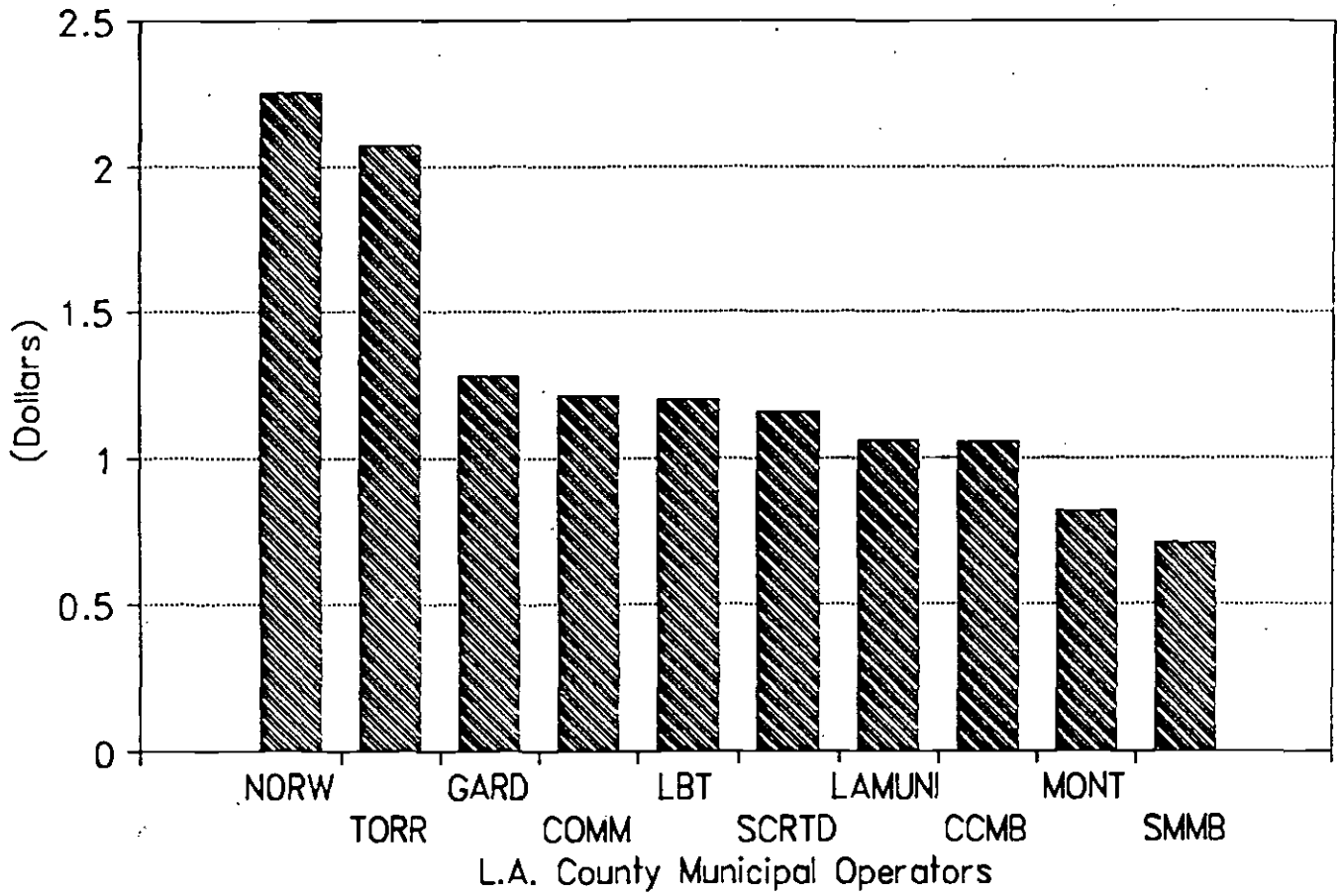
Fiscal Year 1988



GRAPH 18

OPERATING COST/PASSENGER

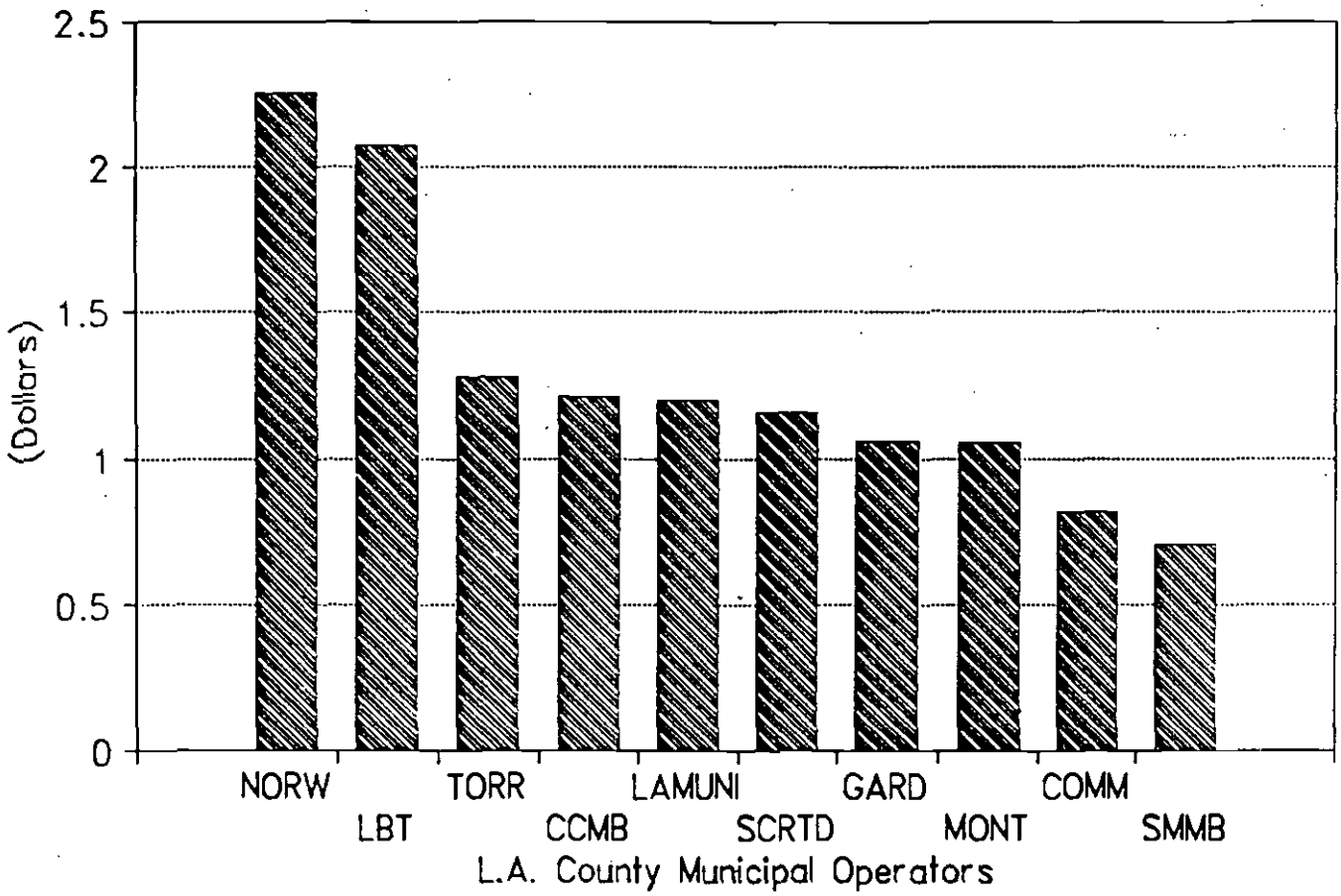
Fiscal Year 1988



GRAPH 19

OPERATING COST/PASSENGER MILE

Fiscal Year 1988



GRAPH 20

SUBSIDY PER PASSENGER MILE

Fiscal Year 1988